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Four hundred and twenty-fourth meeting.

February 12, 1856. — MONTHLY MEETING.

The PRESIDENT in the chair.

The Corresponding Secretary announced the receipt of letters from Guizot, Vicat, Richard Owen, and Sir Benjamin Brodie, accepting the Foreign Honorary Membership of the Academy.

Professor Agassiz addressed the Academy at length on the subject of Classification in Zoölogy. The divisions of the Animal Kingdom, he said, are natural, not artificial. They are based upon ideas emanating from the Author of nature. So far as the systems of naturalists have been in accordance with these ideas, they are true, but not their own; so far as they have been at variance with them, they have been their own, but are artificial, and not true. Professor Agassiz proceeded to remark upon Cuvier's system of classification, and the ideas on which it was based, characterizing it as, in the main, in accordance with the plan of creation. He dwelt particularly upon the class of Reptiles, and spoke of the divisions which different naturalists had made in it. He defined the ideas which are the basis of the division into families and orders. He showed on embryological grounds that the separation of Turtles as a class (proposed by Strauss) was unnatural. He had observed distinct characters of superiority and inferiority among them, which he had adopted as the basis of a division into sub-orders, by which he was enabled to classify the species under a natural arrangement, corresponding to the families adopted by Duméril and Bibron, but which are not true families. Professor Agassiz illustrated his remarks with colored drawings, intended for publication in the forthcoming volume of his Contributions to American Natural History.

Dr. A. A. Hayes exhibited an ingot bar of pure Aluminium, lately received from Paris, obtained by the method and under the eye of M. Deville, who has so largely contributed

to science and the arts, by producing this metal in masses. A brief description of its physical characters, including its sonorousness *per se*, as commented on by M. Dumas, was given; and Dr. Hayes added, that his own observations had led him to conclude that this metal has a large capacity for heat, rising in temperature slowly, and losing its excess gradually. Generally, its mechanical characters may be compared with those of alloyed or standard silver, while in chemical relations it differs remarkably, by approaching more closely to those of the noble metals. A perfectly pure sample, many times heated and cooled, had its surface only slightly changed; while fragments long exposed to the temperature of melting silver did not melt and coalesce. This effect is noticeable in pure gold-filings also, and may arise from molecular changes, induced by the absorption, *without combination*, of oxygen; as it is not observed under suitable fluxes. This metal alloys readily with other metals, and can be easily transferred from the positive to the metal negative of a galvanic series, in the mode of electro-plating. When condensed by hammering, or laminating, it loses its white color in part, acquiring a leaden hue; the white color can be restored by producing the "mat" surface of the silversmith. M. Deville's process for obtaining the metal is founded on the substitution of sodium for the aluminium of the chloride of aluminium, in a state of vapor, and the subsequent fusion of the aluminium, under a flux of chloride of sodium and aluminium. In M. Deville's hands, the process for sodium, as a first step in the production of aluminium, has become one of the most beautiful and effective known in chemistry. A mixture of equal equivalents of carbonate of lime and carbonate of soda is heated in an appropriate vessel, with just so much carbon as will form carbonic oxide with the oxygen present, and the sodium is distilled off from the mass, not only pure, but often continuously.

In reply to a question by the President, Dr. Hayes stated that this had been called a *new metal* erroneously. It has

long been known to chemists, and seven years since suspicions were entertained that its characters had been imperfectly observed, and that it might prove a malleable metal. These suspicions have been more than confirmed, and a metal of high value has been given to the arts.

The importance of the labors of M. Deville is more apparent when considered in connection with general chemistry. Aluminium, before his researches were commenced, was known to us as a spongy, gray metal, which in a heated state attracted oxygen and returned to its earthy condition. Certain characters made up its description, and these presented little attraction, as they promised no useful application. So soon as the genius of Deville enabled him to throw the clear light of experimental results on this subject, chemists saw that he had not only rendered more sure what was known, but had created as it were *a new assemblage of characters to be included under the term aluminium*. Nor was this all; he has added another to the class of bodies represented by carbon, which, in different physical states, possess distinct chemical relations.

The consideration of this relation of physical state, or condition, to chemical action, as a study, has been much advanced by the discoveries of M. Deville; and so beautiful is the illustration, that the field of research thus newly opened through his means is attracting, and will continue to engage, the highest efforts of the best-disciplined minds in its enlargement.

In reply to the question of price, as affecting economical application, Dr. Hayes remarked that it was unsafe to limit the diminution of price in a chemical product, especially where the material of manufacture is abundant. The first iodine he used cost at the rate of forty dollars per ounce; it has been as low as seventeen cents for the same quantity, and yet the sources are by no means common. Phosphorus was in common use at sixteen dollars per pound, and when the price declined to eight dollars, stocks were secured in ex-

pectation of increased price, which at present is about seventy cents. Sodium, in consequence of M. Deville's experiments, is now abundant at a low price, and the list might be extended; proving that, when demand arises for any product like aluminium, the cost of production can be surprisingly reduced. As the metal has many special applications, hardly a doubt exists of its extended consumption.

Dr. A. A. Gould referred to the loss which the Academy had sustained in the recent decease of Dr. Thaddeus William Harris, and offered the following resolutions: —

“Resolved, That the Fellows of the Academy deeply deplore the recent decease of Dr. Thaddeus William Harris, one of the older and most distinguished of their number, and would mingle their sympathies in the sorrow of his bereaved family.

“Resolved, That as a bibliographer and an archæologist, in relation especially to the history of our own country, he held a distinguished rank; that as a naturalist he has not been surpassed by any of his countrymen, and has exhibited a patience, thoroughness, and accuracy of observation in the various departments of Natural History, a truthfulness in the delineations both of his pencil and his pen, and a singular facility in employing language intelligible to the common reader and at the same time fulfilling all the requirements of science, which render him a model for the interrogator of Nature; and that, through a long life of untiring industry, he has accumulated and published a mass of original observations, of an eminently practical bearing, which have won for him high consideration both at home and abroad, and will constitute for him an enduring monument.

“Resolved, That while both the scientific and the practical world are largely indebted to him for his published papers, it is to be regretted that very many others of equal importance, which are known to have been prepared, or are in process of preparation, remain unpublished; and that the Academy tenders its assistance in their publication.

“Resolved, That in view of his unobtrusive and virtuous life, and the eminent though unclaimed distinction due him as a man of science and letters, a committee be appointed to prepare a Memoir of his Life and Labors, to be published by the Academy.”

The resolutions were seconded by Professor Agassiz, who

added, that Dr. Harris had had few equals, even if the past were included in the comparison; and they were adopted unanimously.

In accordance with the last resolution, Dr. A. A. Gould was chosen a committee to prepare a Memoir of the Life and Labors of Dr. Harris for publication by the Academy.

Four hundred and twenty-fifth meeting.

March 11, 1856. — MONTHLY MEETING.

The PRESIDENT in the chair.

Professor Lovering exhibited *L'Appareil Régulateur de la Lumière Electrique*, as contrived and constructed by M. J. Dubosq, of Paris, and presented the following translation of his description of the mechanism:—

“If two metallic wires are attached to the two poles of an energetic voltaic battery, and the free ends of these wires terminate in thin rods of compact carbon from gas retorts or of graphite, at the moment when the two carbon rods touch, a vivid spark is seen to play between the nearest points. If the two rods remain in contact, they grow warm gradually up even to a red heat; next, a part of the carbon is inflamed, burns, and disappears; another portion seems to be volatilized, and little by little the two extremities of the carbon rods, which touched one another, separate more and more, from waste of material, without on this account any cessation of the current circulating in the pile, the wires, and the carbon rods. The part of the rods which has disappeared is found to be replaced by a luminous purple jet, in which incessantly whirls an incandescent vapor of carbonized particles, which the negative pole seems to abstract from the positive pole, or which the latter projects towards the former. The distance between the carbon points has a limit, depending on the intensity of the current, beyond which the purple light is extinguished, the incandescent jet ceases, and the current is interrupted. In a vacuum this distance is much greater than in air, since the electricity, not having the atmospheric pressure to overcome, darts from the carbon even before the points have arrived at contact. But the carbon, which is volatilized and condensed upon the sides of the re-